1-8 Chapter Review and Test

In this chapter you saw how you can use functions as mathematical models algebraically, graphically, numerically, and verbally. Functions describe a relationship between two variable quantities, such as distance and time for a moving object. Functions defined algebraically are named according to the way the independent variable appears in the equation. If x is an exponent, the function is an exponential function, and so forth. You can transform the graphs of functions by dilating and translating them in the x- and y-directions. Some of these transformations reflect the graph across the x- or y-axis or the line $y = x$. A good understanding of functions will prepare you for later courses in calculus, in which you will learn how to find the rate of change of y as x varies.

You may continue your study of precalculus mathematics either with periodic functions in Chapters 5 through 9, which will probably be quite new to you, or with the fitting of other functions to real-world data in Chapters 2 through 4, which may be more familiar to you from previous courses.

The Review Problems are numbered according to the sections of this chapter. Answers are provided at the back of the book. The Concept Problems allow you to apply your knowledge to new situations. Answers are not provided, and, in some chapters, you may be required to do research to find answers to open-ended problems. The Chapter Test is more like a typical classroom test your instructor might give you. It has a calculator part and a noncalculator part, and the answers are not provided.

Review Problems

R1. *Punctured Tire Problem:* For parts a–d, suppose that your car runs over a nail. The tire's air pressure, y, in pounds per square inch (psi), decreases with time, x, in minutes, as the air leaks out. A graph of pressure versus time is shown in Figure 1-8a.

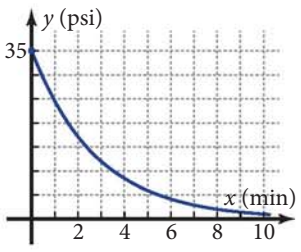

Figure 1-8a

a. Find graphically the pressure after 2 min. Approximately how many minutes can you drive before the pressure reaches 5 psi?

b. The algebraic equation for the function in Figure 1-8a is

$$y = 35 \cdot 0.7^x$$

Make a table of numerical values of pressure for times of 0, 1, 2, 3, and 4 min.

c. Suppose the equation in part b gives reasonable answers until the pressure drops to 5 psi. At that pressure, the tire comes loose from the rim and the pressure drops to zero. What is the domain of the function described by this equation? What is the corresponding range?

d. The graph in Figure 1-8a gets closer and closer to the x-axis but never quite touches it. What special name is given to the x-axis in this case?